BINOD BIHARI MAHTO KOYALANCHAL UNIVERSITY

SYNOPSIS ON

CHARACTERIZATION OF WATER QUALITY STATUS OF SOME ABANDONED WATER BODIES AND THEIR UTILIZATION FOR FISH CULTURE

FOR

DOCTOR OF PHILOSOPHY

IN

FACULTY OF SCIENCE (ZOOLOGY)

UNDER THE SUPERVISION

OF

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1. State of the Art:

Oceanic biological communities add to an expansive extent of the planet. The earth, 66% of which is secured by water, resembles a blue planet-the planet of water-from space [1]. The world's lakes and streams are the most vital freshwater assets. Of the world's crisp water, 69.6% is secured up in the mainland ice, 30.1% in underground aquifers, and 0.26% in streams and lakes. Specifically, lakes are found to possess less than 0.007% of world's new water [1].

Wetlands have been decayed because of anthropogenic exercises, as the urban and agrarian advancement, enterprises, street development, impoundments, asset extraction, and dig transfer, causing considerable monetary and natural misfortunes in the long haul. Eutrophic water bodies are rich in supplements chiefly natural components carbon, nitrogen and phosphorous. These have normally substantial populaces of tiny fish and zooplankton, have less different populaces of fish, and are frequently exhausted of broken down oxygen amid times of warm temperatures. People have adjusted the supplement status of many shut water bodies through the expansion of nitrates, urea, and phosphates. This procedure brings about physical, synthetic and organic changes in the freshwater ecosystem.

The freshwater wetlands are one of the essential beneficial biological systems. They assume a fundamental part in the survival of numerous types of vegetation, including people. As of late, wetlands have turned into the casualty of eutrophication, which is because of expanded anthropogenic weight in the catchments region; expanded use of residential articles, horticultural squanders and stifles sea-going life because of over the top development of green growth. The irrigated land has increased from 3044 km^2 (in 1970) to 4550 km^2 (in 1990), presenting a picture of 49% increase in the area [2]. Currently, in India, there are more than 1,500 large reservoirs covering 1.45 million hectares and more than 100,000 small and medium reservoirs covering 1.1 million hectares [3].

The city of Dhanbad being known for its coal-mining rehearses and consequently being labeled as the Coal Capital of the nation India, this district is lesser known for its horticulture qs. Also, a portion of the farming destinations incorporate the blocks like, Govindpur Block and the Baliapur Block; where several sorts of agribusiness are worked on as in Govindpur Block incorporates Cultivators (24.25%) and Agricultural workers (18.28%) while in Baliapur Block the business incorporates Cultivators (21.36%) and Agricultural workers (13.33%) including the Agriculture Extension as fish culture being practiced at a least controlled level.

The present investigation will give a point by point data on physico-chemical and biological parameters of the water of a portion of the relinquished and disregarded water bodies. The examination will be useful in the use of the forsaken water of the selected water-bodies reasonably for the benefit of the local people by encouraging fish culture.

The investigations on different physico-chemical parameters and the biological parameters would presumably show the level and degree of contamination or defilement in the examined water bodies relying on a few elements including profundities. As more profound ponds show

examples of vertical angles for temperature [4]. Cation, anion substance could likewise display spatial or temporal variations.

The planktonic decent variety and abundance would likewise posture astounding significance to complete future suggestions as to bringing down the levels of defilement in the water. Bacteriological parameters would show the photo of danger to the aquatic life including the neighborhood tenants.

Each of these parameters would on the whole demonstrate the status of water quality regarding physio-chemical parameters and biological parameters thereby characterizing their degree of withstanding the water quality according to the endorsed gauges [5] based on which it would be suggested as to what could be the best variety of fish be cultured in the examined waters.

2. Literature Review:

The checked varieties in physico-compound parameters and the wealth of gliding macrophytes in lake prompt ecological anxiety and can be considered as one of the vital elements for lessening zooplankton biodiversity [6]. Pond receiving high measure of organic matter is hard to manage [6]. A pond receiving residential sewage discharge can be managed for angle culture, particularly, for air relaxing angles (can confront oxygen insufficiency) like *Heteropneutes fossils, Clarias batrachus, and Channa punctatus* after rainstorm for a half year (October to March) [7]. Coal void is a surface pit created after open cast mining which gets loaded with water which can be used for business angle culture with little administration of natural carbon application [8]. Most noteworthy plenitude of *Brachionus* group is found during winter while least one amid autumn and summer [9] The nearness of these types of *Brachionus (B. plicatilis, B. angularis and B. calyciflorus)* in high arrangement demonstrates eutrophication of the Lake [9]. According to one of the studies carried out by [10], the Physico-chemical and biological parameters of water found in Abandoned Coal Quarries is favourable for fish culture except the alkalinity and plankton concentration which could be improved by application of cattle dung and lime treatment.

3. Problems to be investigated:

- To analyze the water nature (physical, chemical, and biological) of forsaken water bodies
- To find out the nutrient status
- To analyze the conceivable outcomes promoting fish culture practice

4. Research Objectives:

- To discover the level of contamination
- To recommend the remedial measures
- To recommend better methods for water bodies administration
- To upgrade the best possible usage accessible of water assets
- To suggest the varieties of fish that could be cultured

- To enhance the status of provincial individuals

5. Hypothesis

Ponds provide the natural environment for the fishes. Particularly taken ponds for carrying out the research are neglected and in poor condition. At present they are not being used for any productive purpose whereas several ponds in the locality are engaged in the fish culture business. Through this study we will try to understand the water quality of these ponds in a better way and it is an attempt to find out an opportunity including probability of fish culture.

6. Research methodology – Research Design:

- Study Area

Govindpur Block and Baliapur Block

Sampling sites will include three ponds i.e. **Rejali pond** in Govindpur Industrial area, **Kichinn pond** located near to Pradhan Khunta junction (Baliapur), and **Bhokta pond** located in Pandeydih, Baliapur. These ponds are in a very bad condition in terms of water quality. The Rejali pond receives dumps from the market including the sewage waste arising from local residential area, exhibiting a very high growth of water hyacinth (*Eichhornia*) and *Hydrilla*. The Bhokta pond and Kichinn pond, on the other hand receive domestic sewage discharge along with getting polluted by the usage of pond water for the purpose of washing of clothes and bathing by locals.

- Sample Collection

Samples of water would be collected from the chosen deteriorated water bodies for their further examination. The analysis of Physico-chemical parameters except the ionic parameters, will be done monthly while microbiological and the plankton study will be carried out in pre monsoon (summer season), monsoon (rainy season) and post monsoon (winter season). The ionic study will be done quarterly.

- Laboratory methods for water analysis

    - Analysis of **physical** nature of water
    - Temperature: Digital thermometer
    - Photoperiod: Will be taken in hours
    - Turbidity: Sechhi disc technique
    - Electrical Conductivity: Digital conductivity meter
    - Total Dissolved Solids: APHA, AWWA, WEF/1995. APHA Publication
    - Total Suspended Solids: Standard method according to [11]

- Analysis of **chemical** nature of water
    - Total Alkalinity: Titration method according to [11]
    - Dissolved Oxygen: Winkler's modified method according to [12]
    - Carbon dioxide: Sodium hydroxide method according to [11]

- Biochemical Oxygen Demand: Dilution standard method (APHA)
- Chemical Oxygen Demand: Standard method according to APHA
- pH: Digital pH meter/Indicator dyes
- Total Hardness: EDTA Titrimetric method [11]
- Sodium (Na^{+}): Flame Photometer [11]
- Potassium (K^{+}): Flame Photometer [11]
- Calcium (Ca^{++}): Atomic Absorption Spectrophotometer [11]
- Magnesium (Mg^{++}): Atomic Absorption Spectrophotometer [11]
- Chromium (Cr^{+6}): Atomic Absorption Spectrophotometer [11]
- Cobalt (Co^{+3}): Atomic Absorption Spectrophotometer [11]
- Chloride (Cl^{-}): Argentometric Method/Mohr's Titration Method
- Nitrate (NO^{-}_{3}): Nitrate Electrode Method/Brucine-sulphanilic acid method
- Phosphate (PO_4^{3-}): Stannous Chloride Method/ Vanadomolybdophosphoric Acid Method /Ascorbic Acid Method [11]

- Study of **Biological** components of water
  - Enumeration and abundance of plankton Phytoplankton and Zooplankton: Sedgewick Rafter technique
  - Bacterial count: Total coliform and Fecal coliform: Membrane Filter Technique/MPN index as per standard methods [13]

Statistical Analysis

- To test the presence of various Chemical and Biological conditions and growth of fish, Correlation and test of significance of sample will be done.
- Statistical tool SPSS will also be used to confirm the Correlation of various factors and fish culture.
- Simpson's Diversity Index, Sorensen Community Similarity Index, and Shannon-Weaver Index; will be used in order to study the indices of species diversity of Zooplankton and Phytoplankton.

7. Significance:

Culture of fish in the proposed area of study is one of the important sources of economy for a particular group of people. Increasing knowledge about the relationship between quality of water and growth of fishes will enhance the socio-economic condition of the area.

8. Future Prospects:

- Appropriate use of land and water bodies with least proposed expenses.
- Advancement and uplifting of destitute individuals living in the Govindpur Block and the Baliapur Block either as a method for coordinate wage or an option one by the way of life of fishes in the studied water bodies. Refined fishes could be expended too in type of sustenance by the culturists.

- Limiting the contamination levels in the researched water bodies by recommending the corrective measures in this manner to a degree achieving the "clean environment" motto.

9. Limitations:

Any research work is not completely flawless, hence the presented research plan also has to be seen in light of some limitations which may include

- Data biasness during the survey data collection
- Observational studies require multiple laboratory resources.

10. Tentative Chapterization:

- **Introduction and Review of literature**
  It will be providing an introduction to the work done during the research tenure including the advancement made in the area. Reviews of the published works will be mentioned under this heading.
- **Methodology**
  Here, a detailed description will be provided on the study area, sampling sites, sample collection, and water quality parameters.
- **Result and Discussion**
  Quarterly analyzed water quality parameters will be mentioned here along with the comparison made.
- **Conclusion**
  This section will be including description on what concluding remarks will be made on the basis of the study.
- **References/Bibliography**
  Enlisting of the works or sources that will be cited, will be mentioned here.
- **Appendices**
  This section will be including the photo plates, list of acronyms, symbols, etc.

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